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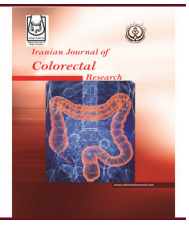

Presentation and Outcomes of Patients with Colorectal Malignancies Undergoing Emergency Surgery – Experience from a Tertiary Care Center in India

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Abstract

Background: Patients with colorectal cancer (CRC) presenting acutely to the emergency department vary in their physiological statuses and disease stages, necessitating a tailored surgical approach. This study assessed the presentation, surgical management, and perioperative outcomes of emergency CRC.
Methods: A retrospective analysis was conducted on data collected from 44 patients presenting with acute CRC at the Postgraduate Institute of Medical Education and Research, Chandigarh, India, from January 2020 to January 2022. Presentation, pathological, and surgical outcomes were assessed.
Results: The mean age at presentation was 53.04±15.04 years (19-77). Intestinal obstruction was the most common presentation. A total of 24 colorectal resections (54.6%) were performed, along with 14 diversion colostomies (31.8%) and 6 diversion ileostomies (13.6%). The length of hospital stay (LOH) was 8.5±5.6 days, with a discharge rate of 77%. The 30-day mortality rate was 9.09%, and the readmission rate was 2.27%. A comparison of tumor resection versus non-resection procedures revealed statistically significant differences in mean age and LOH (P=0.019 and P=0.032, respectively). Tumor, Node, and Metastasis (TNM) staging was completed in 26 patients (56.5%); among them, 3 had stage I (11%), 8 had stage II (31%), 7 had stage III (27%), and 8 had stage IV (31%) disease. Among all patients, 23 (50%) had T3 disease, and 29 (63%) had moderately differentiated tumors. The median time to start adjuvant treatment was 3.5 months after surgery.
Conclusion: This single-center retrospective study found that acute presentations of colorectal cancer in the emergency department were commonly associated with advanced-stage disease and significant physiological derangements. These factors presented considerable challenges to surgical approaches and perioperative management, potentially impacting long-term outcomes. Further studies are needed to assess the generalizability of these findings.

Keywords: Colorectal Cancer, Emergency, Outcomes, Acute, Surgery

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Introduction

Colorectal cancer (CRC) is the third most prevalent cancer and has the second highest cancer-specific mortality rate. Nearly 1.9 million new patients are diagnosed with CRC annually (1). CRC has an annual incidence of 6.9 per 100,000 people in India, with a yearly growth rate of 20.6% (2). Approximately one-third of all CRC cases present as emergencies (3). Malignant large bowel obstruction is the most common emergency presentation of CRC (3, 4). Acute presentations are is associated with aggressive tumor biology, a high risk of physiological derangement, poor optimisation, and the need for emergency surgery. Most patients with acute presentations of CRC have disseminated disease at the time of diagnosis, advanced-stage disease, hemodynamic instability, and higher rates of stoma creation, bail-out procedures, and lower resection rates (5-7). Studies have also indicated an increased association between the acute presentation of CRC and younger populations (8-10). In a study conducted by Lee et al., there was a statistically significant association between the deranged physiology, characterized by increased prothrombin time and coagulation abnormalities, and increased tumor size, depth of invasion, and overall shorter survival in patients with CRC (11). The incidence of complications such as surgical site infections (SSI) and anastomotic leaks in emergency CRC surgeries is also higher, which may be due to the poor optimization and physiological derangement of patients in acute presentation (7). In emergency settings, long-term oncological outcomes, quality of life, and overall survival are poorer compared to those associated with elective CRC cases. The morbidity in acute presentations ranges from 32% to 64%, while the mortality rate is between 15% and 34% (3, 5). Therefore, to determine the long-term outcomes in high-risk emergency presentations, we considered studying the initial trends of emergency presentation in an Indian setup. This study aimed to assess the presentation, surgical management, and outcomes of emergency CRC cases in a tertiary care center in northern India.

Patients and Methods

Study Design

This retrospective observational study was conducted at the Postgraduate Institute of Medical Education and Research, Chandigarh, India. Emergency surgical records from January 2020 to January 2022 were reviewed. The institute's ethics committee (INT/IEC/2025/SPL-46) approved the study.

Study Population

The study population consisted of all 105 patients who underwent emergency colorectal surgery. Among these, only those who had emergency surgery for de novo CRC were included, as confirmed by the final histopathological results.

Inclusion Criteria

All the patients who underwent emergency surgery for de novo CRC, as confirmed by the final histopathology.

Exclusion Criteria

Patients with appendicitis, trauma, and iatrogenic injury, as well as those undergoing reoperation caused by complications of elective abdominal surgery, were excluded from the study. Additionally, patients who experienced disease progression following prior surgery or chemotherapy were also excluded.

Data Collection

Collection included the demographic profile (age and sex), disease profile, symptoms, comorbidities, and American Society of Anesthesiologists (ASA) (12) status. Clinical conditions such as blood parameters and radiological findings were documented, along with surgical details including the type of surgery, stoma formation, operative duration, and blood loss. Postoperative outcomes were assessed, encompassing surgical site infections, chest complications, re-exploration, Clavien-Dindo grade (13), mortality, and length of hospital stay (LOH). Additionally, histopathology data regarding type and stage were recorded using standardised pro forma.

Statistical Analysis

Statistical Package for Social Sciences (SPSS) version 22.0 (IBM Corp., USA) was used for data analysis. Descriptive statistics were employed to analyze the data. Continuous variables were presented as means with standard deviations and ranges, while descriptive data were reported using the interquartile range (IQR). Categorical variables were presented as frequencies and percentages. The chi-square test or Fisher's exact test was used as a significance test for qualitative data. Independent t-test or Mann-Whitney U test was used as a significance test to identify the mean differences between quantitative and qualitative variables, respectively. A p-value of less than 0.05 was considered statistically significant, after assuming all the rules of statistical the tests.

Results

A total of 105 patients underwent emergency colorectal surgeries, of whom 44 (41.9%) had CRCs and were included in the study according to the inclusion and exclusion criteria. The mean age at presentation was 53.04±15.04 years (19-77). Overall, 26 patients (59.9%) were under the age of 50. The gender distribution in the cohort consisted of 29 men (65.9%) and 15 women (34.1%). The most common

presenting complaint was intestinal obstruction, reported in 28 patients (63.6%). Other presenting complaints included lower gastrointestinal bleeding in eight patients (18.2%), bowel perforation in three patients (6.8%), altered bowel habits in three patients (6.8%), and necrotising soft tissue infection of the perineum in two patients (4.6%). carcinoembryonic antigen (CEA) levels were >5 ng/ml in 14 patients. Among the cohort, three patients (6.8%) with rectal cancer were diagnosed preoperatively and were receiving neoadjuvant chemoradiation therapy (NACRT). Among all patients, 30 (68.2%) had a preoperative established diagnosis of colorectal cancer, whereas 14 patients (31.8%) presented with an acute abdominal emergency and were diagnosed postoperatively. The details of the patient profiles and clinical presentations are presented in Table 1.

All patients were resuscitated and treated in the emergency department prior to surgery. All patients underwent surgery within 48 hours of presentation to the emergency department.

Table 1: Patient Profile and Presentation (n=44)

Details	N (%)
Mean Age (Years)	53.04±15.53
Age <50 years	26 (59.9%)
Gender	
Man	29 (65.9%)
Woman	15 (34.1%)
Comorbidities	
Diabetes	6 (13.6%)
Hypertension	9 (20.4%)
Coronary Artery Disease	2 (4.5%)
Chronic obstructive pulmonary disease	2 (4.5%)
Chronic kidney disease	1 (2.25%)
Hepatitis C positive	1 (2.25%)
Hypothyroidism	1 (2.25%)
Lynch syndrome	1 (2.25%)
Spinocerebellar degeneration	1 (2.25%)
History of Tuberculosis	6 (13.6%)
ASA* Status	
I	18 (40.9%)
II	18 (40.9%)
III	7 (15.9%)
IV	1 (2.3%)
Presenting complaints	
Intestinal obstruction	28 (63.6%)
Lower gastrointestinal bleed	8 (18.2%)
Bowel perforation	3 (6.8%)
Altered bowel habits	3 (6.8%)
Necrotizing soft tissue infections of the Perineum	2(4.6%)
Neoadjuvant treatment	3 (6.8%)
Clinical condition at presentation	
Vitals Stable	43 (97.7%)
Shock	1 (2.25%)
Acute kidney injury	2 (4.5%)
INR%>1.3	26 (59.1%)
Mean CEA# levels (ng/ml)	125.63±444.0
Radiological Findings	
Dilated small bowel loops	29 (65.9%)
Dilated large bowel loops	33 (75%)
Air under diaphragm	1 (2.5%)
Transition zone	28 (63.6%)
Colorectal thickening	38 (86.4%)
Ascites/ Free fluid	21 (47.7%)
Evidence of metastasis	11 (25%)

*ASA- American Society of Anaesthesiologists; #CEA-Carcinoembryonic Antigen; %INR- International Normalised Ratio

Table 2: Surgical Details and Postoperative Outcomes (n=44)

Details	N (%)
Location of the tumor	
Right-sided colon	11 (25%)
Left-sided colon	13 (29.5%)
Rectosigmoid	12 (27.3%)
Anorectum	8 (18.2%)
Surgery performed	
Ileocecal resection	1 (2.27%)
Right Hemicolectomy	4 (9.1%)
Extended right hemicolectomy	3 (6.82%)
Transverse colectomy	1 (2.27%)
Left hemicolectomy±Sigmoidectomy	3 (6.82%)
Extended left hemicolectomy±Sigmoidectomy	1 (2.27%)
Hartmann's Procedure	5 (11.4%)
Low anterior resection	2 (4.55%)
Abdominoperineal resection	3 (6.82%)
Subtotal colectomy	1 (2.27%)
Total resections	24 (54.6%)
Diversion colostomy	14 (31.8%)
Diversion ileostomy	6 (13.6%)
Stoma Formation	
Total	32 (72.7%)
Large bowel	21 (47.1%)
Small bowel	11 (13.6%)
Mean operative time (hours)	2.69±1.06
Mean intraoperative blood loss (ml)	160±133
Mean intraoperative fluid requirement (litres)	1.88±0.90
Wound class	
Clean	0 (0%)
Clean contaminated	21 (47.7%)
Contaminated	19 (43.2%)
Dirty	4 (9.1%)
Surgical site infection (SSI)	
Superficial	4 (9.1%)
Deep	9 (20.4%)
Organ space	3 (6.8%)
Intra-abdominal collections requiring drainage	3 (6.8%)
Other complications	
Lung atelectasis	2 (4.5%)
Pleural effusion±Lung atelectasis	3 (6.8%)
Pneumonia	1 (2.27%)
Postoperative obstruction	3 (6.8%)
Deep vein thrombosis	0 (0%)
Re-exploration	0 (0%)
Mean length of postoperative stay (days)	8.5±5.6
Outcome	
Discharge	34 (77.3%)
Discharge against medical advice	7 (15.9%)
Mortality	3 (6.8%)
Readmission	1 (2.27%)

Table 3: Comparison of various parameters between tumor resection and non-tumor resection

Parameters	Diversion stoma without resection (n=20)	Tumor Resection (n=24)	P value
Age (years) Mean±SD*	47.05±14.52	57.5±13.78	0.018[1]
Sex n(%) (Male/Female)	13(65.0%)/7 (35.0%)	15 (62.5%)/9 (37.5%)	0.864[2]
Post-operative complication n(%)	6 (30.0%)	12 (50.0%)	0.179[2]
Chest complications n(%)	2(10.0%)	6 (25.0%)	0.259[3]
Length of Hospital Stay in Days (Median and IQR#)	5 (3-13)	10 (7-12)	0.032[4]
In hospital Mortality n (%)	2 (10.0%)	2 (8.3%)	>0.999[3]

*SD: Standard deviation; #IQR: Inter Quartile Range; [1]Independent t-test; [2]Chi-square; [3]Fischer's exact test; [4]Mann-Whitney U test

The operating surgeon assessed the patients intraoperatively, and the decision to proceed with either a diversion stoma or oncological resection was based on the intraoperative findings and the patient's stability. Diversion stomas were created for patients with unresectable tumors or those requiring NACRT for rectal tumors. The surgical details and postoperative outcomes are presented in Table 2.

Comparative analysis of various parameters between patients with colorectal cancer who underwent tumor resection and those who did not is shown in Table 3. The mean age of patients who did not undergo tumor resection is 47.05 years (±14.52), while those who did have a higher mean age of 57.5 years (±13.78). The p-value of 0.019 indicates a statistically significant difference, suggesting that young patients have more aggressive tumor, which contradicts resection. The gender distribution was relatively similar between the two groups, with 65% men and 35% women in the no-resection group, and 62.5% men and 37.5% women in the resection group. In the no-resection group, 30% experienced postoperative complications compared to 50% in the resection group. The median LOH for the no tumor resection group was 5 days (IQR: 3-13), while for the resection group, it was significantly longer at 10 days (IQR: 7-12). The p-value of 0.032 indicates a statistically significant difference, suggesting that patients who underwent tumor resection had longer hospital stay. The in-hospital mortality rate was similar between the two groups, with 10% in the no-resection group and 8.3% in the resection group. There was a considerable difference in age and LOH between the two groups, with resection patients being older and having a longer hospital stay. However, Gender distribution, postoperative complications, chest complications, and in-hospital mortality rates did not show significant differences between the two groups.

After oncological resection, the decision for anastomosis or temporary stoma was based on the patient's duration of acute presentation, nutritional status, and intraoperative condition. Among all patients, a stoma was created in 32 of them (72.7%). The histopathology records of all patients were retrieved. Data regarding lymph node yield were obtained from the histopathological records of 33 patients (75%). The median number of lymph nodes removed was eight, and the overall lymph node positivity ratio was 0.13. For patients with positive lymph nodes, the positivity ratio was 0.52. Among the 44 patients, 41 (93.2%) were diagnosed with adenocarcinoma. The tumors were well differentiated in four patients (9.8%), moderately differentiated in 29 patients (70.7%), and poorly differentiated in eight patients (19.5%). In one patient (2.4%), mucinous differentiation with signet ring cell histology was found. Basi-squamous carcinoma was found in one patient (2.3%), Ewing sarcoma in one patient (2.3%), and one with malignant melanoma (2.3%). Of these patients (n=41), 26 (63.4%) could be staged according to TNM staging (AJCC 8th edition, 2017) (14). Among these 26 patients, three (11.5%) had stage I disease, eight (30.8%) had stage II disease, seven (26.9%) had stage III disease, and eight (30.8%) had stage IV disease. The details of the histopathological variables are outlined in Table 4.

Table 4: Histopathology and stage of the study

Details	N (%)
Type of the tumor (n=44)	
Adenocarcinoma	41 (93.2%)
Basi-squamous carcinoma	1 (2.3%)
Ewing sarcoma	1 (2.3%)
Malignant melanoma	1 (2.3%)
Differentiation of adenocarcinoma (n=41)	
Well	4 (9.8%)
Moderate	29 (70.7%)
Poor	8 (19.5%)
Mucinous differentiated adenocarcinoma	1 (2.4%)
TNM Staging (n=26)	
I	3 (11.5%)
II	8 (30.8%)
III	7 (26.9%)
IV	8 (30.8%)

Discussion

Emergency CRC surgery accounted for 41.9% of all colorectal emergency surgeries in the current study. Previous studies have reported this to be between 19% and 35% of all colorectal emergency surgeries (5, 6). Colorectal malignancies are usually diagnosed individuals during their seventh and eighth decades of life. Earlier series of CRC patients from the

Western world revealed a lower age at the time of the emergency presentation of CRC (7, 8). Studies from Africa and Asia have shown a predilection for acute presentation of CRC in younger populations (9, 10). In our study, 59.9% of patients were <50 years.

Intestinal obstruction is the most common clinical presentation of CRC, accounting for 41-80% of cases. Perforation has been shown to occur in 2-56% of cases. Other less common presentations include gastrointestinal bleeding and altered bowel habits (3, 9, 15, 16). In the present study, intestinal obstruction was the most common presentation; However, perforation accounted for only 6.8% of cases. Notably, lower gastrointestinal bleeding was found in 18.2% of patients, making it the second most common presentation. This series also included 4.6% of patients with necrotising soft tissue infection (NSTI) of the perineum, and all of these patients had cancers found in the anorectum.

Lee et al. (11). Showed that prolonged prothrombin time and coagulation abnormalities are significantly associated with larger tumor size and greater depth of invasion, and overall shorter survival in patients with CRC. The current study revealed that 59.1% of the patients presenting to the emergency department had a deranged coagulation profile. Although abnormal physiology during the acute phase can contribute to these derangements, it should be considered an additional factor alongside poor tumor biology and prognostic value in CRC patients.

A study conducted by Mun JY et al. showed that the CEA levels in patients with CRC who presented to an emergency department were significantly greater than those in patients undergoing elective procedures (14). Our study revealed a mean CEA level of>125 ng/ml. Patients with >5 ng/dl CEA were found to have either stage III or IV disease. This indicates the aggressive nature of the disease and the greater likelihood of presenting with a more advanced stage of CRC in emergency situations.

Most studies have shown that left-sided CRCs (those of the splenic flexure, descending colon, sigmoid colon, and rectum) account for the majority of emergency presentations (15). However, Talebreza et al. have shown that up to 60% of CRC emergencies are due to right-sided tumors (including the cecum, ascending colon, hepatic flexure, and transverse colon) (16). In the current study, nearly 75% of cases were associated with left-sided tumors.

Emergency CRC surgeries have been associated with higher rates of stoma formation. Stomas are created to protect the anastomosis against leakage or resection without anastomosis in patients with a high risk of anastomotic leakage and as a palliative procedure for rectal tumors to enable neoadjuvant treatment, enabling resection in a staged manner. Palliative procedures have been shown to increase with age, tumor stage and rectal tumor location. Previous studies have shown stoma creation rates ranging from 43-59% (7, 17, 18). In the present study, the stoma creation rate was 72.7%. Nearly 45% of patients underwent only diversion stoma because their locally advanced tumors required neoadjuvant treatment or because of intraoperative instability precluding resection.

In the current study, the mean age of patients who did not undergo tumor resection is 47.05±14.52 years, while those who had resection have a higher mean age of 57.5±13.78 years. However, a study performed by Tanis et al showed a mean age of 70 years in the resection group and 68 years in the diversion stoma group (19).

Post-operative complications in the current study were observed in 50% of patients who underwent tumor resection, compared to 30% of patients without resection. In the study by Tanis et al., the significant morbidity was 23.9% for the resection group and 11.8% for the no resection group (19). The median LOH for the no tumor resection group was 5 days (IQR: 3-13), 10 days (IQR: 7-12), significantly shorter than for the resection group. In the study by Tanis et al.,(19) the median hospital stay was 16 days for patients who had resection and 12 days for those who had diversion. The in-hospital mortality rate was 9.09% for the resection group and 3.7% for diversion stoma patients in the study by Tanis et al. However, in the current study, it was 10% in the no resection group and 8.3% in the resection group. These findings suggest that while tumor resection may be associated with longer hospital stays, it does not significantly impact post-operative complications or mortality rates compared to patients who did not undergo resection.

Colorectal surgeries are associated with significantly high rates of surgical site infections (SSIs). The incidence of SSI in emergency CRC surgeries ranges from 13% to 29% (7, 20). Several factors contribute to these rates, including increased contamination due to the inability to prepare the bowel preoperatively, bacterial overgrowth due to bowel obstruction and the immunosuppressive inflammatory response of the acute presentation. Nearly 36% of patients in this study experienced SSI. The higher rates were attributed to poor nutrition and lower socioeconomic strata of the patients presenting to the center. An increase in the rate of SSI can also delay adjuvant treatment and subsequently add to an unfavourable prognosis.

The postoperative mortality rates following CRC emergency surgeries ranged from 2% to 38% in different series. The plausible explanations for these discrepancies include advanced tumor stages and the socioeconomic status of the patient population (9, 16). In the present study, a mortality rate of 6.8% was observed. However, this might be an inaccurate presentation, as nearly 16% of patients discharged against medical advice and were not included in the follow-up.

We found a median yield of eight lymph nodes in oncological resection specimens, which is below the

minimum requirement of 12 lymph nodes required for appropriate staging of CRC. In contrast, the data from Western literature did not indicate a discrepancy between elective and emergency CRC resections (21). These findings necessitate further investigation to better understand the differences between these population groups.

The final TNM stage in this study revealed that 58% of the patients had stage III or IV tumors. A meta-analysis by Golder et al. showed a significant association between increased tumor stage and the incidence of emergency CRC (14). Talebreza et al. and Nguyen et al. both studies have shown that stages III and IV comprised a larger proportion of emergency CRC patients (16, 17). The presence of metastasis at initial presentation has been reported in up to 33% of patients (22, 23). The rates observed in this study were consistent with previously reported rates.

Limitations

This study had several limitations. It was a retrospective observational study conducted at a single center in northern India, and the study population represented only a small portion of the country. Additionally, the absence of a control group was also another limitation of this study. Furthermore, long-term follow-up data are lacking.

Conclusion

In this single-center retrospective study, acute presentations of CRC in the emergency department were commonly associated with advanced-stage disease and significant physiological derangements. These factors posed substantial challenges to the surgical approach and perioperative management, potentially impacting long-term outcomes. Further studies are needed to assess the generalisability of these findings.

Authors' Contribution

All the authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by Dr. Yashwant Sakaray and Dr. Naveen Maheshwari. The first draft of the manuscript was written by Dr. Yashwant Sakaray and Dr. Naveen Maheshwari, and all the authors commented on previous versions of the manuscript. All the authors have read and approved the final manuscript.

Data Availability Statement

The data used for this research were obtained from previous patient records from the Medical Records Department, PGIMER, Chandigarh.

Ethical Approval

The institute ethics committee INT/IEC/2025/SPL-46 approved the study.

Conflicts of interest: None declared.

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